MEETING SUMMARY, FORMER NANSEMOND ORDNANCE DEPOT (FNOD) RESTORATION ADVISORY BOARD (RAB)

To: Restoration Advisory Board Members, Interested Parties

From: Sandra Chaloux, CEC, Inc., RAB Facilitator

Ken Hafner, U.S. Army Corps Project Manager and RAB Co-Chair

Re: June 7, 2002 RAB Meeting Summary

RAB Members Present: Affiliation:
Jim Bennett Dominion Lands

Fred Copeland GE
Bill G. for Tim Fink TCC

Ken Hafner USACE, Project Manager, Gov't. Co-Chair

Bruce Johnson Community

Marian "Bea" Rogers Community Co-Chair

Eric Salopek VDEQ

David Saunders Bennett's Creek

Rob Thomson EPA

Cherie Walton Reactives Management Corporation

RAB Facilitator Present:

Sandra Chaloux CEC, Inc.

RAB Members Absent:

Russ Dudley
Tim Fink
VDOT
TCC

Thomas O'Grady City of Suffolk

Dave Taylor Suffolk Fire Department

7:05 p.m. Introduction and Welcome/Call to Order/General RAB Discussion

(Sandra Chaloux – CEC, Inc.)

The meeting was called to order. RAB members and guests introduced themselves. Sandra reviewed the meeting agenda. No corrections were noted for the April 2002 RAB meeting summary.

7:15 p.m. Corps Project Update

(Ken Hafner, Rick Aiken, Cheryl Fromme, Keri Lappas– USACE)

Ken began the Army Corps update. He mentioned that there were problems in the beginning of the year due to a lack of an assigned budget, which ultimately led to a lack of funding to award contracts. The domino effect of not being able to fund the contracts and start the work in a timely manner created delays in the overall project delivery. He said the Corps has finally received all of its third quarter funds. Ken said now the Corps is working hard to award all the contracts in June that were supposed to be awarded over the previous 8 months. He reported that the Corps has also been able to secure funds for the Ordnance OE Cleanup for the entire fiscal year so far, which constitutes \$2 million of their \$3.88 million budget. Ken also told the RAB that the Corps will have to slip the public meeting for the Impregnite Kit Area Record of Decision to October. He said the Corps is about 6-9 months behind schedule on a number of the projects. He hopes to make up for most of the delays over the long term. Ken told the RAB that the Corps has received \$3.6 million of the \$3.88 million funds for the project this year already. Ken hopes the project can pick up some extra funds before the end of the year.

Nansemond River Beachfront project

Rick Aiken presented photos of the beachfront. There is an erosion problem at the site. The Corps plans to continue to sweep the beach, removing any remaining slag and other burnt-out armament items, and is considering the placement of some stones offshore to reduce the erosion. The Corps has a contract in place to determine what is required to stabilize the erosion of the bank. This project is anticipated to start this summer before hurricane season.

Ordnance & Explosives Investigations

Rick showed the RAB a site map with the OE investigation grids and pointed out that the yellow grids are complete, but the red, white and gray grids are still being finished. The difficulty in completing the white and gray grids is how long the process may take to clear away the huge portions of garbage and debris, since it all has to be sifted manually. The Corps has recently started an enhanced manual sifting effort in the GE Main Burning Ground area. He showed a photo of the sifting structure. We hope that the new sifting procedure will help to speed up the process.

Bea Rogers asked whether any of the OE grids were underneath the asphalt. Rick said that the only road affected is Welner Drive. The Corps has completed OE work where the new Continental parking lot is located. He said that OE sifting is taking longer to complete than originally anticipated. The OE field team is usually able to clear away debris from a grid in one week. However, now it takes several weeks to complete a grid because of the depth of refuse. Bea asked about the depth of the digging. Rick responded that the Corps is clearing "to depth", which means digging where the magnetometers say there is metal until they find and remove it. He said that they have gone as deep as eight to ten feet in one hole and are still finding scrap metal but not many OE items. The Corps will continue searching to ensure that each OE grid is clean. Rick said that the new process is indeed speeding up the process, but it is not perfect by any means. He showed photos of a sink type container that was recovered in the GE Main Burning Ground area. He described it as a piece of steel that is 4 feet by 6 feet. The challenge has been trying to determine what it was used for and then testing the soil below it for contamination. The soil below this metal item is contaminated with PAHs (Polyaromatic Hydrocarbons) which is a byproduct of combustion. Cheryl Fromme said that these constituents were consistent with what they expected to find.

Rick continued with an OE Grid plan for Pit 18. Some adapter boosters were found in Grid B-2 in the area of Pit 18, which was briefed by the Corps at prior RAB meetings. The field team expanded their search around Grid B-2 with additional 100x100 grids, and found a few more OE items. The Corps then added some more OE investigation grids. While working on the new OE grids, the Corps will need to close down either Jamestown Road or the whole intersection coming into TCC over the next few weekends. Rick showed some photos of the area near Pit 18 and a photo of the TNT bags that were found near Pit 18. Four bags were found to date. They were about the size of a half of a cigar (1 inch by a few inches long) and contained about a half an ounce of TNT. Now the Corps will do more investigation in this area to determine the extent of these bags. These bags were found 3 feet below ground surface. The TNT found does not pose a significant explosive hazard because it would have to be contained in a steel pipe for example, and then fuzed to be explosive. With the new finding, the work is expected to take much longer than a few weekends to complete.

The Corps will continue with a geophysical magnetometer survey to determine the extent of the debris field where the TNT was found.

Ken said that the grid was about 100 x 100 feet and that so far they had only completed about one quarter of it. He said that there was 2,700 lbs of trash that was removed and the only

ordnance related items were the four small bags of TNT. Ken said that the field team may never have recovered the TNT at all had it not been for sifting through all the metallic debris in this area. The TNT would not have been detected by the magnetometer. One bag was dated 1917. Ken said that they had no idea what it was used or how it got here, so the Corps will continue with the in-depth analysis. Unfortunately, he foresees the work taking over several months to complete instead of a few weekends.

Land Use Control Implementation Plan (LUCIP)

Rick said that the responsiveness summary is in draft form. It represents the Corps responses to all the comments they received from the regulatory agencies and other reviewers, as well as comments received from the general public. He anticipates that the LUCIP will be signed by the end of the month. Rick said the Corps has been working with the City of Suffolk on the Memorandum of Agreement for this plan. After this is complete, the Corps will negotiate Memorandums of Agreement with affected landowners. These agreements will enable landowners to help maintain the controls needed for each property.

Sitewide Well Testing

Rick pointed out that the Corps is not only conducting residential well testing near Streeter Creek but is initiating a sitewide hydrogeologic study. He said that the Corps will be installing and testing wells across the entire site so they can get a better idea of how the groundwater moves. He discussed that the groundwater underneath the TNT area is contaminated and it is necessary to understand the big picture before the Corps can determine what should be done with each individual site.

Residential Well Sampling

Keri Lappas presented slides on the progress of the residential well testing that took place on April 24th and 25th in Respass Beach. Eight samples were collected from homes there as a follow-up to two prior sampling efforts in the area. The samples were analyzed for environmental chemistry parameters as well as drinking water quality. The main objective of the analysis was to determine if any FNOD Chemicals of Concern are in the groundwater adjacent to the former depot in the Respass Beach area. FNOD Chemicals of Concern are generally from ordnance disposal activities performed at the former depot, but may also be due to other normal facility operations and maintenance. They include metals such as lead, aluminum, and arsenic, explosives such as TNT, and organic compounds such as semi-volatile oils and burning by-products such as PAHs. EPA approved the residential well sampling plan. The Corps tested for:

Environmental Contaminants:

- TCL VOCs, Volatile Organics, 8260 (number of lab analysis test)
- TCL SVOCs, Semivolatile Organics, 8270
- TCL PAHs, Polyaromatic Hydrocarbons, 8310
- TCL Metals, 6010/7000 series
- Explosives, 8330 and 8091
- Pesticides and PCBs, 8081A/8082

Water Quality:

- Fluoride, 4500 F-C
- Nitrite/Nitrate, 4500 NO2/B, 4500 NO3/E
- Total Coliform, OPNG-MUG

Keri explained that the sample locations were selected based on the convenience of the homeowner and access, the presence of good water flow, sample taps that were close to wells and sample taps that could be disinfected properly. The samples were taken from hose bibs outside and inside. A RAB member asked if the homes test had filtration or purifications systems and whether the samples were taken before and or after these systems. Keri responded

that only one resident had a purification system on their well. The field team collected samples before the water went through these filtration systems. She showed photos of the sampling effort and equipment. Each sample was approximately 12 liters of water. The samples were sent to 3 labs for analysis –the primary lab, a quality control lab, and a local lab for coliforms.

Keri said that the Corps had received preliminary results of the samples from the labs. They indicate that there is no presence of FNOD-related contaminants in any of the wells tested. She said that the initial water quality results were done as a service to homeowners as a way of extending appreciation for their cooperation. However, initial water quality findings show some non-FNOD concerns that have been discussed with the individual homeowners.

Keri explained that the data was currently being validated. Once the lab completes this validation, a report of the sampling effort will be prepared by the Corps as a final step. Keri and Ken opened up the discussion to the floor for questions, there were none fielded at that time.

Ken went on to say that during the sampling, they did find information they felt was pertinent to certain homeowners, which they did communicate to them. The day they received the samples, calls were made to each of the relevant individuals as well as the Suffolk Health Department and the DEQ because these issues were outside the scope of the Nansemond investigation. The issues were related to individual well drinking water quality concerns. Ken said that on the day before the Memorial Day weekend, phone calls were made to provide affected homeowners with a contact name and phone number at the Health Department. A certified letter was then sent as a follow-up procedure to the homeowners.

Ken highlighted the fact that representatives were present from both the Suffolk Health Department as well as from the VADEQ to answer questions. Ken suggested that if any members had questions they could be fielded at that time or after the meeting was concluded.

Cherie Walton asked what problems were found and if these problems were found in all the wells tested. Ken responded that some of the concerns were common to multiple wells, while a couple of other issues were isolated to specific individual wells. While he realized that he was not giving specifics, Ken assured the group that he was being deliberately cautious out of respect to the privacy of the individual homeowners. He asked the group if they all wanted to know the specifics and Cherie said she was just curious. Ken told the group that one of the main issues on a more common level was the issue of Fluoride. Cherie said that she was really trying to find out if the information had to do with naturally occurring things or other more harmful elements. Ken continued to say that yes, Fluoride was a concern as well as Sodium. He said that neither one of these items surprised the affected homeowners. Ken said that Fluoride was quite common to most of the affected areas, particularly in the deep wells.

The Health Department representative said that all the deep aquifers in Suffolk are high in Fluoride. She said that the Health Department will test residents homes for Fluoride free of charge. It takes about 3-4 weeks to get the results back. High Fluoride can affect young children with forming teeth. The Health Department recommends that people use bottled water for drinking water at homes with young children or a filtration system to address the high Fluoride. Bea pointed out that high Fluoride has also been known to contribute to the increase in brittle bones in the elderly. The Health Department representative said that at high enough levels and with long term exposure there is some proof of brittle bones in adults not just the elderly.

The Health Department representative informed the group that there will be a public meeting on June 17th at Northern Shores Elementary school. The City is proposing a public water and sewer project in the area and they are seeking public input. The public water supply is a

monitored supply and is treated for Fluoride. The City of Suffolk Public Utilities and the Department of Health will have representatives at the meeting to answer any questions for voting on this sewer and water project.

Ken said that on the other isolated incidents of concerns for specific homeowner wells, the VADEQ has set up a case number and is following up on the findings.

7:45 p.m. Regulatory Update (Rob Thomson – EPA, Eric Salopek -VDEQ)

Rob Thomson said that there was nothing new on the horizon from EPA, but we are looking to finalize the LUCIP by the end of this summer. EPA, the Corps, and the state of Virginia will be negotiating a long-term interagency agreement for cleanup at the site. He said he hoped that could be kicked off towards the end of the summer as well. Bea asked how many years was the agreement going to be in place, and Rob responded that the time span of the agreement was not set out in terms of years, but it would address the full cleanup of the site.

Eric Salopek wanted to follow-up with the RAB about a letter that was promised by the State Health Department with regards to the results of the fish tissue sampling that was done at the ponds on site. The Office of Environmental Research and Standards had generated a two-page memo on June 5, 2002 clarifying some issues related to ingestion of fish tissue at FNOD. The data that DEQ collected has been compared to an EPA Risk Assessment Guidance Document, which assesses chemical contaminant data for use with fish advisories. Eric passed out the memo to the RAB members. In addition to the memo, Eric said that the corresponding charts and data would be put on the Corps' project website within a couple of weeks and available for public viewing. Eric pointed out information in the memo that described the four principal contaminants that were found in TCC and J Lake. He indicated that the maximum concentrations that were identified was for mercury, which was .032 parts per million. Eric showed that a comparison was made between the most sensitive receptor, which was a small child under six years with a body weight of approximately 32 lbs. The analysis showed that even with this level of mercury, it would still be safe for a child, as described above, to consume a 4-ounce serving per day, twelve times a month on a sustained basis for this particular child. The correlation point for the FDA is believed to be 2 parts per million as a safety level of mercury in fish. Eric explained that the chemical Chlordane was also found at its maximum levels of .35 parts per billion, the data concluded that 667 fish meals at 4 ounces per meal, could be safely consumed over the period of a lifetime. He summarized by saying that it is safe to eat the fish out there. He said the levels of mercury that were found are consistent with background mercury levels that have been found in the area. It has been attributed to atmospheric transport of western U.S. power plants. Ken said that he would make sure that the information was added to the project web site.

8:00 p.m. **Risk Assessment Discussion** (Dr. Alvaro Alvarado (EPA)

Dr. Alvarado opened the floor for questions on the Risk Assessment video that was presented at 6:00 p.m. The group had no questions at that time and Sandra suggested that Cheryl Fromme give a brief update on the progress of the risk assessment initiative at FNOD. Cheryl asked Drew Rak (USACE Risk Assessment expert) to give the RAB an overview. He pointed out that there are 2 types of risk assessments being done. One called an ecological risk assessment and another referred to as a human health risk assessment. He acknowledged Greg Tracy (USACE Contractor) who has been conducting studies at FNOD for the eco-risk assessments for the shoreline and offshore areas. He explained that the work completed at the James River Beachfront off of I-664 (ie. the debris removed and revetment stones laid along the shoreline) addressed the exposure issue that was described in the video. But now the Corps needs to go back and document what was at the site and look at the groundwater to take a holistic view. We have 2 risk assessments going on at the Horseshoe Pond area –an eco risk assessment and a human health risk assessment. We are hoping to be out there later this summer to take some

samples for the eco risk assessment there. We are also waiting on the collection of some additional data for the human health risk assessment.

He said that the Corps was set to go with a baseline risk assessment for human health at the Main Burning Ground /Steamout Pond when they realized that the Ordnance & Explosives field team needs to finish their work at the site first. Once the explosives are gone, the Corps can go back and look at the chemical contamination. He said the Corps is exploring ways where both efforts can be addressed simultaneously. He summarized by saying that the James River Beachfront, the Horseshoe Pond, and the Main Burning Ground are the three sites where the Corps has plans to do risk assessments.

The Corps is in the process of filling some data gaps for the risk assessment at the Main Burning Ground. Drew said overall they are in the middle of the risk assessment process at FNOD.

Cheryl Fromme asked Greg Tracy (USACE Contractor) if he would give a recap about the offshore work. Greg said that they have completed a draft of the baseline ecological risk assessment for the offshore area. The offshore area is defined as water seaward of the low tide line. We just completed a supplemental sampling effort of the old pier area last week where some additional sediment and fish tissue samples were taken. The results of this effort will be incorporated into the final risk assessment. The report will be put on the project website. He said he did not expect to find any problems. Greg said that the project team had just started planning for the inshore and inland waters risk assessment. The first meeting to discuss this is scheduled for tomorrow. Greg said that inshore is being defined as the low tide line to the shore. Cheryl said that the inshore areas were at different stages of completion. She mentioned that the far offshore was almost completed but the other studies were only in the initial stages. Jim Bennett inquired as to whether the risk assessment took into consideration the occurrence of natural metals and other elements that appear on the FNOD Chemicals of Concern list which may be naturally occurring in the James River system. Dr. Alvarado (EPA) said that the EPA would look at those considerations at the end of the process rather than at the beginning. He said that they typically do the risk assessment to see what actually poses a risk. They will eliminate constituents (such as Fluoride) that are at concentrations consistent with background levels at the end

Jim pointed out that prior studies of the sediments in the river indicate high concentrations of metals that have resulted from corroding ships and barges using the river and may not be a result of the former depot. Dr. Alvarado said that normally in a case like that, the concentration would be diluted to a high extent and that the chemical in question would show up in the assessment as a rare chemical, but at a low concentration and would not pose a risk.

Drew said that the Corps is in the process of completing a background soil study at FNOD so that they will be able to determine the typical levels of various chemicals in the soil at FNOD.

Cheryl pointed out that some of the Areas of Concern may come off the list once investigated. Other Areas of Concern may be elevated to Source Areas depending on what they find.

Sandra asked the RAB members if they had any concerns they want the project team to address with the risk assessments being done at the site. None were mentioned.

Dr. Alvarado said it would be helpful to know if any segments of the local population rely heavily on fishing or crabbing as a source of food. If so, he wanted the Board's input on how this population would be recognized and/ or even notified. Bea pointed out that crabbing along

the bridge is only done seasonally. Information on future land use also is important to factor into the risk assessment.

A meeting participant recommended Dr. Joseph Rule, a geochemist and the Assistant Dean of Sciences at Old Dominion University, as a source of information for the RAB Board and the EPA. He has conducted a lot of biological and sediment studies in the Hampton Roads area including the south shore. He may prove to be a useful source, because he has taken over 10,000 samples around the Hampton Roads area alone.

A meeting participant asked if the isolated contaminants in some of the residential wells could indicate a larger problem in the community. Eric said the state (VADEQ) will be conducting some additional sampling in the area to determine whether other wells in the community have the same contaminant. Cheryl pointed out that samples were only taken from 4 deep wells and 4 shallow wells in Respass Beach. This would not provide enough information to tell if there is an areawide problem. VADEQ will be investigating this further. She believes that the results of the VADEQ study will reap more information and will be able to determine if the contaminants discovered were isolated to the well it was originally found in or if it they presented concern for a wider community audience. Eric Salopek said that VADEQ concurs that based on the data to date, they believe that the contaminants found in Respass Beach are in no way related to FNOD. He said that is why the additional investigation will be handled separately from FNOD by the Tidewater office of VADEQ and the Health Department. This is now a state lead investigation.

Rick asked Dr. Alvarado 1) What is EPA's definition of "acceptable risk" for the kinds of things we are looking for? 2) What are we looking for? 3) What is of concern to you? 4) What are we going to look at -at the Nansemond River Beachfront? Dr. Alvarado explained that EPA views each chemical contaminant as a carcinogen or non-carcinogen. Each type is calculated differently. Non-carcinogens cause adverse health effects at certain exposure levels. He gave an example of table salt, in moderation, it is actually good for the body, but once it exceeds a certain level, it can cause high blood pressure and even death. For carcinogens, EPA has established a safe level of a chance of 1-in- a-million of getting cancer when exposed to the chemical in question. To put that into perspective, cancer is one of the most common causes of death. He said that 1 in 4 of us will eventually succumb to cancer, so 1-in-a-million is quite a small chance. EPA's designated safe range is between 1-in-ten-thousand and 1-in-a-million. Anything greater than 1-in-ten thousand, would merit action to be taken. He said this was over a lifetime of exposure not a single exposure. For carcinogens, it is calculated for 70 years. Noncarcinogens are calculated over 30 years. Dr. Alvarado said in terms of the Nansemond River Beachfront he is most concerned about contaminated soil and sediment that could contain particles that could stick to someone's hand and be injested. He said EPA is not concerned with the larger pieces of slag that are out there.

Dr. Alvarado said he takes into account site history. So far it looks like TNT and metals. At the same time, we wouldn't limit ourselves to that if other contaminants appear. We'll be looking at how each contaminant moves on site also. Rick asked if Arsenic is being considered for the sitewide risk assessment. Dr. Alvarado said yes. If the levels are between 1-in-ten thousand and 1-in a million and we don't find a source of the Arsenic than it is more of a regulatory issue for EPA than a cleanup concern. It will be factored in the overall risk assessment of the site.

What are PAH's? Polyaromatic Hydrocarbons -these are combustion by-products. The maximum concentration found so far has been 40 ppm at FNOD. He said this was not much of a concern. PAHs tend not to migrate easily in soil or water. They tend to move through the air mostly. PAHs are carcinogens and represent a whole class of compounds with varying levels

of toxicity. The biggest concern would be if high concentrations are found in a small area; then they would warrant an investigation.

What are VOCs? Volatile Organic Compounds – these compounds are generally classified as being volatile; they volatilize into the air and are generally a solvent based contaminant and generally present a problem because once they get into the environment, they move quickly in the soil and groundwater. They can also volatilize in cellars and basements if there is high concentrations in groundwater, so they can be quite dangerous.

8:20 p.m. RAB Business & Landowner Updates

Bea provided a follow-up on the CPEO Environmental Oversight Meeting that she and Cherie attended. Cherie passed out a summary of the meeting that her husband prepared to the RAB members. When the official summary is available from CPEO –Bea said she will provide copies to the RAB. Bea informed the RAB that they will not be able to meet at TCC for the August RAB meeting. Sandra and Bea spent the day before researching other meeting space options. She told the RAB that we looked at another room at TCC. This room would require a great deal of walking to get to the room and would require the project team to tote AV equipment to the room. We also looked at Northern Shores Elementary School. The only room that seemed suitable was the library –which is also used by the girl scouts and boy scouts. We would have to move our meeting night to meet at the school. It would also involve a fee. Bea said the third place we looked at was the charm. The Bon Secour Harbour View Medical Center has AV equipment, carpet, a refreshment area, has plenty of tables and chairs, and is open at no charge to us on the nights we meet. The RAB agreed to meet at the Bon Secour Harbour View Medical Center in August. Sandra will send out information about the venue location and meeting particulars.

Sandra told the group that she had received two resignations from the Board. Fred Bright would no longer be able to attend due to extensive travel and the inability to find a replacement. Sandra thanked him for his contributions. Ted Sherman from Continental Properties also resigned from the Board but requested to remain on the mailing list for project updates.

Jim Bennett reported that Dominion Lands has two parcels that are about to be sold. Continental Properties has an option for a parcel for similar use as their new office building and parking lot. There is also a letter of intent for a 545-acre parcel that would be used for mix use that would include some residential. He wanted to know the timeframe for the Record of Decision for the Impregnite Kit Area. The terms of the letter require that the property not be an NPL listed property. Dominion is anxious to get the Impregnite Kit area delisted. The delisting probably won't be official until next summer but a comfort letter can be generated once the Record of Decision is signed (which will likely be by the end of this year). Jim said the transaction would not take place until rezoning is approved by the City. He estimated that process to take 6 months to complete but it could take longer. Ken asked what would it take to make the prospective buyer feel comfortable enough to proceed with the rezoning effort? Jim did not know. Ken said he would coordinate with Jim as needed. Rick pointed out that the part of the Impregnite Kit area that is listed is just the actual TNT removal area which is a much smaller area than the original site area that was designated.

8:30 p.m. **Public Comment Period / Q&A**

No public comments or questions.

Ken said thanks to the Health Department and VDEQ Regional Office representatives who attended the meeting to answer questions.

8:45 p.m. Establish Action Items/Set Agenda and Date for Next RAB Meeting

The next RAB meeting was set for August 1. The meeting will be held at the Bon Secour Medical Center in Harbour View. The meeting room is on the second floor –just take the elevator up.

Agenda items for the next RAB meeting:

- LUCIP
- Dominion Lands Update
- Planning for October Public Meeting
- Regular Army Corps Update

Action Items:

- Sandra to send out info on the Bon Secour Medical Center meeting location
- Ken to put VADEQ Memo/Info on Project Web Site

9:00 p.m. Meeting Adjourned

Guests Present:	Affiliation:
Michael Sarros	VDOT-Hazmat Environmental
Bill Gibbons	TCC
Dewey Stinson	AMSEL/SAIC
Keri Lappas	USACE-Contractor
Dr. Alvaro Alvarado	EPA
Drew Rak	USACE -Baltimore.
Greg Tracy	SAIC
Harry Wheeler, Jr.	TechLaw, Inc.
Carey Horne	VDH-Suffolk
Gene Siudyla	DEQ-TRO
Shonia M. Holloway	HRPDC
Cheryl Fromme	USACE-Norfolk District
Rick Aiken	USACE-Norfolk District
TJ Die	Zapata Eng.
Carrey Webster	VADEQ-TRO
Dave Sheets	USACE-Huntsville District
George Wade	USACE-Huntsville District
Robert Nore	USACE-Huntsville District
Ed Henson	Zapata Engineering